Art. XVI. *An Inquiry into the Nature of Sleep and Death, with a view to ascertain the more immediate causes of death, and the better regulation of the means of obviating them.* Republished by permission of the president and council of the Royal Society, from the Philosophical Transactions for 1827, 29, 31, 33, and 34: being the concluding part of the author's experimental inquiry into the laws of the vital functions. By A. P. W. Philip, M. D., F. R. S., L. & E. 8vo, pp. 254. London, 1834.

This is almost wholly a republication of seven of the author's papers, published originally in the Transactions of the Royal Society of London; only two of which, the last, have an immediate reference to the chief subjects of the title. The *first* is "on the functions of the nervous system, and the relation which they bear to the other vital functions;" the *second* consists of "some observations on the effects of dividing the nerves of the lungs, and subjecting them to the influence of voltaic electricity;" the *third* is devoted to "Some observations relating to the function of digestion:" the *fourth* is "on the sources and nature of the powers of circulation:" and the *fifth* "on the relation which subsists between the nervous and muscular systems in the more perfect animals, and the nature of the influence by which it is maintained." On the subjects of all these papers the views of Dr. Philip have been long known. They could not fail, indeed, to be impressed upon the memory, from the variety of shapes in which they have been presented to the reader; their clearness is, however, by no means enhanced by the repeated references which he makes to other of his contributions to science.

From a review of all the facts contained in his paper on sleep, the author arrives at the following conclusions:—

"1. That in the brain and spinal marrows alone reside the active parts of the nervous system.

"2. That the law of excitement in the parts of these organs, which are associated with the nerves of sensation and voluntary motion, is uniform excitement followed by proportional exhaustion, which, when it takes place to such a degree as to suspend their usual functions, constitutes sleep; all degrees of exhaustion which do not extend beyond them and the parts associated with them, being consistent with health.

"3. That the law of excitement in those parts of the brain and spinal marrow which are associated with the vital nerves is also uniform excitement, but which is only, when excessive, followed by any degree of exhaustion, no degree of which is consistent with health.

"4. That the vital, in no degree partaking of the exhaustion of the sensitive system in sleep, only appears to do so from the influence of the latter on the function of respiration, the only vital function in which these systems co-operate; in consequence of which its organs, without being in any degree debilitated, are less readily excited.

"5. That the law of excitement of the muscular fibre, with which both the vital and sensitive parts of the brain and spinal marrow are associated, is interrupted excitement, which, like the excitement of the vital parts of these organs, is only, when expressive, followed by any degree of exhaustion; and

"6. That the nature of the muscular fibre is every where the same, the apparent differences in the nature of the muscles of voluntary and involuntary motion depending on the differences of their functions, of their relation to the brain and spinal marrow, and of the circumstances in which they are placed." p. 150.

The peculiarities of dreaming, Dr. Philip ascribes to the partial operation of the causes of disturbance, and some of the sensitive parts of the brain being capable of excitement without disturbing the others: "and thus it is that the more near we are to awaking, the more rational our dreams become, all parts of the brain beginning to partake of the excitement; which has given rise to the adage, that morning dreams are true."

In a preceding paragraph he observes, that when we awake we are conversing, and are thus obliged to employ words, the usual incongruities of dreaming do not occur. The ideas are sufficiently detailed to enable us to correct the suggestions of the imagination. "No man," he says, "ever dreamt that he was telling another that he had been flying through the air:" —in which the author is assuredly in error. It has happened to us to do this very thing, that no man ever did do; and every inveterate dreamer could give instances in opposition to the conclusions of Dr. Philip.

In his last paper, Dr. Philip divides the forms of death into five classes. In the first, he places the only *natural death*, that from old age, where all the powers of life, in consequence of the operation of the agents, which excite their organs, gradually decline, and death is only the last sleep, characterized by no peculiarity, in which these powers, partly from their own decay, and partly from the lessened sensibility increasing the difficulty of restoring the sensitive system, become incapable of this office, in consequence of which the individual awakes no more.

*Secondly.* The death which he considers to resemble most nearly that from old age is that from excessive exhaustion of the sensitive system, "from the operation of stimulants of greater power than this system can bear, notwithstanding the intervals of such imperfect repose as their continued operation admit of, without the supervention of disease; which, not being capable of relief from the continued action of the vital parts of the brain and spinal marrow, by sympathy spreads to them, the affection of each system increasing that of the other, till all the powers of the sensitive system are destroyed."

*Thirdly.* The death, in which disease of the sensitive system arises, not from causes over exciting, but directly debilitating it, the debility which they induce being of the same nature with that from excessive excitement, and running the same course as in the second stage of the preceding form.

*Fourthly.* The death which arises from the privation of the natural stimulants of the organs of life: and

*Fifthly.* That which arises from diseased states of those organs, analogous to the states produced in the organs of the sensitive system by the causes which make their impression on them. p. 226.

"If," says the author, "the foregoing include all the modes of decay, the physiological nature of death, in its various forms, is referable to very simple principles. In the natural decay, the excitability of the organs of both the sensitive and vital systems is gradually impaired by stimulants, which, whether existing within our bodies, or making their impression from without, belong to inanimate nature: for it is by the impression of such stimulants alone that the functions of life are maintained. In the different kinds of violent death, with the exception of the death which arises from a failure of the natural stimulants of the vital organs, which is comparatively rare, and extremely simple in its nature, we find the excitability of one or both of these systems, or some parts of one or both of them, capable of influencing all the others, more quickly destroyed by the continued operation of causes which either stimulate beyond the limits of health, or applied beyond the limits of their stimulant operation, destroy the powers of life, either by directly destroying the powers of the sensitive system, or depriving it of those powers by which it is maintained. All these causes, it is evident, tend to the same effect; the extinction of the sensibility, which constitutes death according to the common acceptation of the term, the immediate cause of which, therefore, exists in the sensitive parts of the brain and spinal marrow." p. 228.

In another passage, Dr. Philip remarks, that the last feelings, in natural death, are necessarily of the same nature as those that precede sleep. It is only when the course of our decay is disturbed, that suffering of any kind attends it. It appears to us, however, that, physiologically speaking, the difference between sleep and death is sufficiently appreciable. During sleep a process of renovation is going on in the organs of animal life, which adapts them for subsequent activity, and contrasts signally with the annihilation of the functions that constitute death; hence the marked difference between healthy sleep, and the state of coma or stupor induced by a morbid cause, from which the patient is aroused languid and exhausted, instead of active and recruited. The idea of the intense suffering immediately preceding dissolution is, and has been, so general, that the term "Agony" has been applied to it in many languages. In its origin, the word means nothing more than a violent contest or strife, but it has been extended so as to embrace the pangs of death and any violent pain. The agony of death, however, physiologically speaking, instead of being a state of mental and corporeal turmoil and anguish, is one of insensibility. The hurried and laboured breathing, the peculiar sound on inspiration, and the turned up eye-ball, instead of being evidences of suffering, are now admitted to be signs of the brain having lost all, or almost all, sensibility to impressions. Whilst the brain is possessed of consciousness, the eye is directed as the will commands, by the appropriate voluntary muscles of the organ; but as soon as consciousness is lost, and the will no longer acts, the eye-ball is drawn up involuntarily under the upper eye-lid. All the indications, then, of mortal strife are such in appearance only: even the convulsive agitations, occasionally perceived, are of the nature of the epileptic spasms, which we know to be produced in total insensibility, and to afford no real evidence of corporeal suffering. An easy death—euthanasia—is what all desire; and, fortunately, whatever may have been the previous pangs, the closing scene in most ailments, is generally of this character. In the beautiful mythology of the ancients, Death was the daughter of Night, and the sister of Sleep. She was the only divinity to whom no sacrifice was made, because it was felt that no human interference could arrest her arm: yet her approach was contemplated without any physical apprehension. The representation of Death, as a skeleton covered merely with skin, on the monument at Cannæ, was not the common allegorical picture of the period. It was generally depicted on tombs as a friendly genius, holding a wreath in his hand, with an inverted torch;—as a sleeping child, winged, with an inverted torch resting on his wreath; or as Love, with a melancholy air, his legs crossed, leaning on an inverted torch,—the inverted torch being a beautiful emblem of the gradual self-extinguishment of the vital flame.

The disgusting representations of Death from the contents of the charnel-house were not common until the austerity of the 14th century, and are beginning to be abandoned. In more recent times, Death seems to have been portrayed as a beautiful youth; and it is under this form that he is represented by Canova, on the monument which George the IV. of England erected in St. Peter's at Rome, in honour of the Stuarts. R. D.